

# High Performance Computing-Accelerated Metrology for Large Optical Telescopes, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



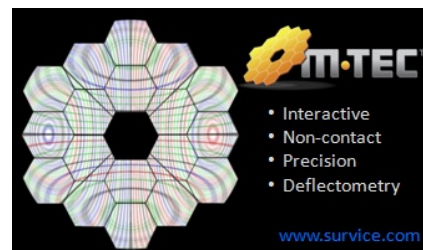
## ABSTRACT

NASA has unique non-contact precision metrology requirements for dimensionally inspecting the global position and orientation of large and highly-polished multi-segmented mirrors (in an as-installed configuration), such as those used on the James Webb Space Telescope. SURVICE Metrology has assembled a world-class team of metrologists and optical physicists to develop M-TEC, an innovative non-contact metrology solution that extends traditional deflectometry for determining reflective-surface profiles by combining pattern matching and high performance computing techniques. In addition to our in-house staff of experts in metrology and optics, our team includes industry-recognized academic experts in metrology. Our solution has demonstrated the ability to accurately measure the global position and orientation of mirror segments in an as-installed configuration using non-contact means from a safe distance to allow measurements to be made with minimal risk to the asset. SURVICE proposes to further research and develop the technology under the Phase II effort, culminating with a fully-functional and validated prototype.

## ANTICIPATED BENEFITS

### To NASA funded missions:

**Potential NASA Commercial Applications:** This NASA SBIR will provide opportunities to advance the state-of-the-art in metrology solutions applicable to large, segmented mirrors. This includes high-precision optics used by the Department of Defense, which is a key market SURVICE will explore and exploit in Phase III commercialization efforts. With segmented mirrors being the likely or preferred type of construction for most future large optical telescopes, there will be many opportunities to employ the SURVICE metrology solution on NASA and European telescope programs, to include the James Webb Space Telescope (JWST), the Wide-Field Infrared Survey Telescope (WFIRST), the Advanced Technology Large-Aperture

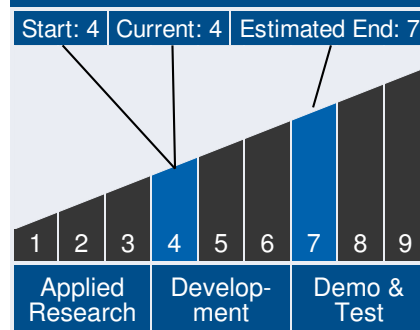


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## Technology Maturity



## Management Team

### Program Executives:

- Joseph Grant
- Laguduva Kubendran

### Program Manager:

- Carlos Torrez

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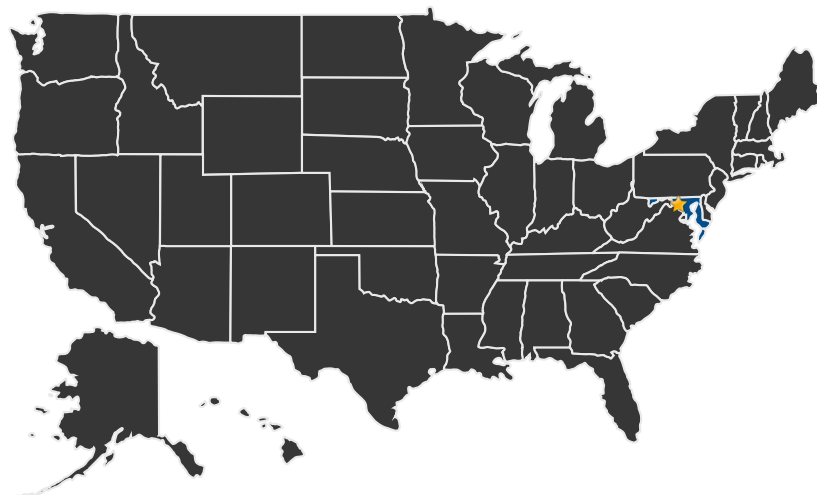


Space Telescope (ATLAST), and the European Extremely Large Telescope (E-ELT).

## To the commercial space industry:

Potential Non-NASA Commercial Applications: The manufacturing of DoD, NASA, and international space program telescopes is performed by numerous Original Equipment Manufacturing (OEM) firms. These firms support a broad spectrum of customers that include but are not limited to the NASA. SURVICE has already identified both US and international partners that are interested in the proposed technology development.

## U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States  
With Work

★ **Lead Center:**  
Goddard Space Flight Center

## Other Organizations Performing Work:

- SURVICE Engineering Company, LLC (Belcamp, MD)

## Management Team (cont.)

### Principal Investigator:

- John Ebersole

## Technology Areas

### Primary Technology Area:

Materials, Structures, Mechanical Systems and Manufacturing (TA 12)

- └ Manufacturing (TA 12.4)
  - └ Electronics and Optics Manufacturing Process (TA 12.4.3)
    - └ Optics Fabrication (TA 12.4.3.2)

### Secondary Technology Area:

Science Instruments, Observatories, and Sensor Systems (TA 8)

- └ Remote Sensing Instruments and Sensors (TA 8.1)

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## PROJECT LIBRARY

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### Presentations

- Briefing Chart
  - (<http://techport.nasa.gov:80/file/17842>)

## DETAILS FOR TECHNOLOGY 1

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### Technology Title

High Performance Computing-Accelerated Metrology for Large Optical Telescopes